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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,507	04/25/2007	Marie Holmgren	514862003600	8409
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MORRISON & FOERSTER LLP 425 MARKET STREET SAN FRANCISCO, CA 94105-2482			EXAMINER ARIANI, KADE	
			ART UNIT 1651	PAPER NUMBER
			MAIL DATE 10/25/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/581,507	<b>Applicant(s)</b> HOLMGREN ET AL.	
	<b>Examiner</b> Kade Ariani	<b>Art Unit</b> 1651	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

**DETAILED ACTION**

Claims 1-33 are pending in this application and were examined on their merits.

**Claim Rejections - 35 USC § 101**

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 29-31 are rejected under 35 U.S.C. 101, because the claimed invention is directed to non-statutory subject matter.

Claims 29-31 are directed to a culture of "*Chalara parvispora*, *Trametes versicolor*, *Trichoderma viride*, *Thielavia terrestris*, *Posita placenta*, *Gloeophyllum trabeum*, *Phanerochaete chrysosporium*, and a yeast". *Chalara parvispora*, *Trametes versicolor*, *Trichoderma viride*, *Thielavia terrestris*, *Posita placenta*, *Gloeophyllum trabeum*, *Phanerochaete chrysosporium*, are naturally occurring fungal cells and are not a "manufacture". The claims do not require any physical transformation of the fungal and yeast cells. The claimed invention would impermissibly cover every substantial practical application of, and thereby preempt all use of a product of nature

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (in IDS US Patent No. 4,840,903) in view of Nag Raj & Hughes (in IDS, New Zealand Journal of botany, 1974, Vol. 12. p.115-129) and further in view of Lee et al. (Biotechnology Letters, 1999, Vol. 21 p.965-968) and further in view of Duff & Murray (Bioresource Technology, 1996, Vol. 55, p.1-33) and further in view of Sun et al. (in IDS Bioresource Technology, 2002, Vol. 83, p.1-11) and further in view of Merchant et al. (Biotechnology Letters, 1988, Vol. 10, No. 7. p. 513-516) and further in view of Clausen et al. (Proceedings of the 4<sup>th</sup> meeting of the Pan American Biodeterioration Society; 1994, New York Press: p.231-242).

Claims 1-19 are drawn to a process for the production of ethanol through fermentation of organic starting materials, the fungus species *Chalara* is used, (capable of metabolizing pentose and hexose), fungi *Chalara parvispora*, fungus is used in a mix of fungi, second fungus is *Trametes versicolor*, mix of fungi comprises at least one of *Trichoderma viride*, *Thielavia terrestris*, *Posita placenta*, *Gloeophyllum trabeum*, *Phanerochaete chrysosporium* or a combination thereof, yeast species *Saccharomyces*

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(*Saccharomyces cerevisiae*), batch fermentation, a continuous process, the pH is adjusted to the range of 4.5 –7, the temperature is in the interval of about 26 to about 36°C, the starting material is wood or non-wood plant material (spent liquor from pulping), and a growth medium for a fungus.

Wu teaches a process for the production of ethanol through fermentation of organic starting materials by a fungus species capable of metabolizing xylose (pentose) and glucose (hexose) (Abstract and Fig 4.), and a yeast capable of xylose fermentation (column 6, lines 18-10).

Wu teach batch fermentation, continuous fermentation (column 4, lines 28-31), pH is adjusted to about pH 6.0 (column 4, Table 1), temperature is in the interval of about 26-36°C (column 5, lines 55), a process of producing ethanol from starch (column 6, Example V), and a growth medium for a fungus comprising 0.1 g CaCl<sub>2</sub>, 0.5g MgSO<sub>4</sub>·7H<sub>2</sub>O, 1.0 g KH<sub>2</sub>PO<sub>4</sub>, NaCl, D-xylose, mannose, D-galactose (column 4 lines 13-15 and Table II, also column 5).

Wu teach D-glucose, D-cellobiose, and with D-xylose from hemicellulose, comprise the three most important and abundant renewable hydrolysates of any plant biomass (column 6, lines 9-13). Xylose is by far the largest constituent of hemicellulose and, as previously indicated, has been one of the most difficult to ferment to ethanol on an economic basis (column 5, lines 67- and column 6 lines 1-3). If a microorganism can ferment both D-cellobiose and D-xylose, it will reduce the end-product inhibition of cellulase during enzymatic hydrolysis of cellulose and thus enhance ethanol production (column 6 lines 34-38).

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Wu does not teach *Chalara parvispora*, *Trametes versicolor*. However, Nag Raj & Hughes teach *Chalara parvispora* and *Chalara* species capable of growing on wood and decayed wood (see the whole document especially page 117).

Lee et al. teach ethanol is an effective stimulator for laccase production in a culture of *Trametes versicolor*, and further teach, the important role of laccase in degrading lignin in wood pulp and in decolorizing and detoxifying the vast amount of effluents generated by the pulp and paper industry (p. 965, Abstract, and Introduction).

Duff & Murray teach cellulolytic fungi of *Trichoderma* species, and fungus *Phanerochaete chrysosporium* and teach these organisms use cellulose as a primary carbon source and are of industrial interest for their potential to convert waste woody cellulosic materials to biofuel (p.7, 2<sup>nd</sup> column, lines 7-16). Duff & Murray further teach ethanol fermentation by *S. cerevisiae* (p.20, 1<sup>st</sup> column, 2<sup>nd</sup> paragraph, lines 5-11).

Duff & Murray teach one of the identified weaknesses of early efforts to develop viable wood-to-ethanol bioconversion processes has been the lack of organism capable of fermenting pentose sugars. Once this need was identified, a considerable effort was mounted to isolate organisms capable of fermenting pentose sugars to alcohol (p. 20, end paragraph).

Sun et al. teach cellulose degrading activity of fungus *Phanerochaete chrysosporium* and species of *Trichoderma viride* (p.6, 1<sup>st</sup> column, 3<sup>rd</sup> paragraph and p.7, 2<sup>nd</sup> column). Sun et al. further teach use of a cellulase mixture from different microorganisms or a mixture of cellulases and other enzymes in the hydrolysis of cellulosic materials has been extensively studied (p. 7, 2<sup>nd</sup> column, 2<sup>nd</sup> paragraph). Sun

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et al. further teach using lignocellulosic materials such as agricultural residues, grasses, forestry wastes and other low cost biomass can significantly reduce the cost of raw materials for ethanol production, and teach a reduction of the cost of ethanol production can be achieved by reducing the cost of either the raw material or the cellulase enzymes (p.8, 2<sup>nd</sup> column, 2<sup>nd</sup> paragraph, lines 13-17).

Moreover, at the time the invention was made lignocellulosic activity of fungi *Thielavia terrestris* (Merchant et al.), *Posita placenta*, and *Gloeophyllum trabeum* (Clausen et al.) were very known in the art.

Furthermore, at the time the invention was made the advantages of mixed fermentation cultures were known in the art (Duff & Murray p.21-22). It was well known that mixed cultures are capable of utilizing different substrates, and co-cultured organisms might produce metabolic products that inhibit and enhance each other's growth, the interaction of complementary metabolisms, where a compound produced by one organism may be metabolized further by another was also very well known.

Therefore, it would have been obvious to use a mixed culture of fungi belonging to *Chalara* species as taught by Nag Raj & Hughes and *Trametes versicolor* of Lee et al. in the method of Wu to provide the claimed invention. As a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because cultures of fungi of species *Chalara* (*Chalara parvispora*) and of species *Trametes* (*Trametes versicolor*) have properties (lignocellulose (wood) metabolizing, decolorizing, and detoxifying) predicted by the prior art, it would have been obvious to use them in a process for the production of ethanol from waste from forestry and spent

liquor from pulping, since the complimentary metabolisms could be utilized to produce ethanol from the waste liquor and at the same time detoxify it, and reduce the cost.

### ***Conclusion***

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kade Ariani whose telephone number is (571) 272-6083. The examiner can normally be reached on 9:00 am to 5:30 pm EST Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

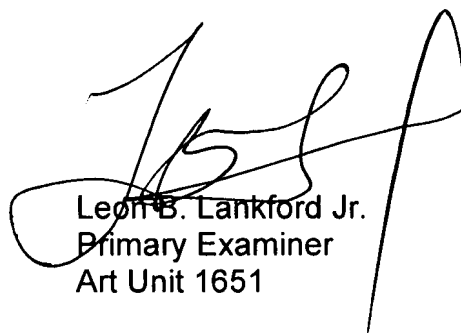


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Examiner  
Art Unit 1651



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